EAST Browser - Tagged | US 4465976 | Tag: S,P,T1 | Doc: 6/29 | "Full" 1/7 (Total images 7) | Front Page | Marked

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Tagged | US 4465976 | Tag: S,P,T1 | Doc: 6/29 | "Full" 1/7 (Total images 7) | Front Page | Marked

United States Patent [19]

Avery et al.

[11] Patent Number: 4,465,976

[45] Date of Patent: Aug. 14, 1984

[54] HALL ELEMENT WITH BUCKING CURRENT AND MAGNET BIASES

[75] Inventors: Grant D. Avery, Loudon; Jacob R. Higgs, Concord, both of N.H.

[73] Assignee: Sprague Electric Company, North Adams, Mass.

[21] Appl. No.: 342,697

[22] Filed: Jan. 26, 1982

[51] Int. Cl.³ G01R 33/06; H01L 43/06

[52] U.S. Cl. ..... 324/251; 338/32 H

[58] Field of Search ..... 324/207, 208, 251, 252; 338/32 H, 32 R

[56] References Cited

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3,192,063 7/1965 Sterig et al. ..... 338/32 H
3,416,030 12/1968 Kuhnlein et al. 324/251
3,613,021 10/1971 Schmidt 330/4

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Gershuni, J. E., "Hall Cell Bias and Offset Circuit", IBM Technical Disclosure Bulletin, vol. 4, No. 20, Nov. 1977, pp. 2149–2150.

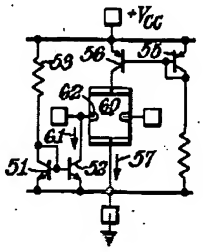
Sprague Engineering Bulletin, 27701, "Hall Effect IC Application Guide", Mar., 1980, p. 17.

Primary Examiner—Gerard R. Strecker
Assistant Examiner—Walter E. Snow

[57] ABSTRACT

A strong magnet is bonded to a conventional Hall element package. A bias current is introduced at one of the output terminals of the Hall element in the direction to cause a reduction in the magnet-bias-induced output voltage. This output voltage is easily reduced by this means to zero. The resulting Hall-element detector is shrouded by a large magnetic blocking field while presenting a low or zero DC output component upon which the signal voltage will be superimposed.

4 Claims, 12 Drawing Figures



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Tagged | US 4465976 A | Tag: S,P,T1 | Doc: 6/29 | Format: CLM

US-PAT-NO: 4465976

DOCUMENT-IDENTIFIER: US 4465976 A

See image for Certificate of Correction

TITLE: Hall element with bucking current and magnet biases

DATE-ISSUED: August 14, 1984

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Avery; Grant D.	Loudon	NH	N/A	N/A
Higgs; Jacob R.	Concord	NH	N/A	N/A

US-CL-CURRENT: 324/251, 338/32H

CLAIMS:

What is claimed is:

1. A ferromagnetic-material detector comprising a Hall element and a magnet being fixedly mounted therewith to produce a magnet-bias flux through said Hall element for producing a magnet-bias-induced Hall voltage across the output terminals of said Hall element, and a bias current generator means being connected to at least one of said Hall element output terminals to cancel at least a portion of said magnetic-bias-induced voltage, said detector further comprising two energizing terminals through which an energizing current maybe introduced into the body of said Hall element from a DC power supply, said bias current generator being comprised of a current-mirror circuit that is connected between said at least one Hall element output terminal and one of said DC energizing terminals.

2. The detector of claim 1 wherein said bias current is of a magnitude for said current -induced opposite-polarity voltage to equal said magnet-bias -induced Hall voltage and produce a near zero net voltage across said output terminals.

3. The detector of claim 1 wherein said bias current generator means is additionally comprised of another current-mirror circuit connected between

Details | Text | Image | HTML | CLM

8	☐	☑	DE 3521546 A	19861218	8	Current converter core overload ; electricity meter - has additiona
9	☐	☑	US 3863150 A	19750128	4	ELECTRICAL CURRENT FLOW INDICATOR
10	☐	☑	US 2310279 A	19430209	18	Telegraph system
11	☐	☑	US 4345201 A	19820817	12	Fault location system with enhanc

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United States Patent [19]

Cebulak et al.

[11] **3,863,150**

[45] **Jan. 28, 1975**

[54] **ELECTRICAL CURRENT FLOW INDICATOR**

[75] Inventors: Steve E. Cebulak; Clifford Harvey Leach; John Henry Westlake, all of Calgary, Alberta, Canada

[73] Assignee: Gentrix Engineering Ltd., Calgary, Albert, Canada

[22] Filed: June 23, 1973

[21] Appl. No.: 372,626

[52] U.S. Cl. 324/133

[51] Int. Cl. G01a 19/14

[58] Field of Search 324/51, 133; 340/255; 317/18

[56] References Cited

UNITED STATES PATENTS

2,567,859	9/1951	Ringo	324/51
2,610,237	9/1952	Benner	324/51 X
3,205,436	9/1965	Donahue	324/51
3,252,052	5/1966	Nash	317/18 D
3,258,693	6/1966	Meyer	324/133 X
3,450,947	6/1969	Rogers	340/255 X

FOREIGN PATENTS OR APPLICATIONS

652,423	11/1962	Canada	324/51
233,431	5/1925	Great Britain	324/51

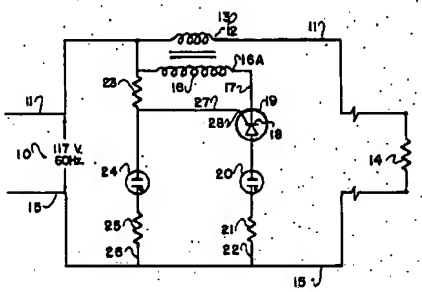
Primary Examiner—Gerard R. Strecker

Attorney, Agent, or Firm—Stanley G. Ade

[57] **ABSTRACT**

A circuit which shows firstly that line voltage is present at the indicator and secondly, whether or not the power dissipating device is in fact drawing power from the current source. The device may be encapsulated with a plug having male and female connections on either end or may be formed integrally within one end or the other of an extension cord.

2 Claims, 2 Drawing Figures



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Tagged | US 3863150 A | Tag: S,P,T1 | Doc: 9/29 | Format: FRO

FIELD-OF-CLASSIFICATION-SEARCH: 324/51; 324/133 ; 340/255 ; 317/18
See application file for complete search history

REF-CITED:
U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL		
2567859	September 1951	Ringo	324/51	N/A	N/A
2610237	September 1952	Benner	N/A	324/51	N/A
3205436	September 1965	Donahue	324/51	N/A	N/A
3252052	May 1966	Nash	317/18D	N/A	N/A
3258693	June 1966	Meyer	N/A	324/133	N/A
3450947	June 1969	Rogers	N/A	340/255	N/A

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
652,423	November 1962	CA	324/51
233,431	May 1925	GB	324/51

ART-UNIT: 258
PRIMARY-EXAMINER: Strecker; Gerard R.
ATTY-AGENT-FIRM: Ade; Stanley G.

ABSTRACT:

A circuit which shows firstly that line voltage is present at the indicator and secondly, whether or not the power dissipating device is in fact drawing power from the current source. The device may be encapsulated with a plug having male and female connections on either end or may be formed integrally within one end or the other of an extension cord.

2 Claims, 2 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 1

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8	☐	☑	DE 3521546 A	19861218	8	Current converter core overload electricity meter - has additiona
9	☐	☑	US 3863150 A	19750128	4	ELECTRICAL CURRENT FLOW INDICATOR
10	☐	☑	US 2310279 A	19430209	18	Telegraph system
11	☐	☐	US 4345201 A	19820817	12	Fault location system with enhanc

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United States Patent [19]

Thompson et al.

[11] 4,345,201

[45] Aug. 17, 1982

[54] FAULT LOCATION SYSTEM WITH ENHANCED NOISE IMMUNITY

[75] Inventors: Brett A. Thompson, Poole; John A. Webb, Fernflown; Martin B. White, Sopley, all of England

[73] Assignee: Membrain Limited, Dorset, England

[21] Appl. No.: 161,484

[22] Filed: Jun. 20, 1980

[30] Foreign Application Priority Data

Dec. 20, 1979 [GB] United Kingdom 7943939

[51] Int. Cl.³ G01R 31/08; G01R 31/28

[52] U.S. Cl. ..... 324/52; 324/73 PC; 324/149

[58] Field of Search ..... 324/52, 67, 73 AT, 73 PC, 324/133, 149

[56] References Cited

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4,184,338 1/1980 Pichtenberg 324/52

FOREIGN PATENT DOCUMENTS

2443716 3/1976 Fed. Rep. of Germany 324/52

OTHER PUBLICATIONS

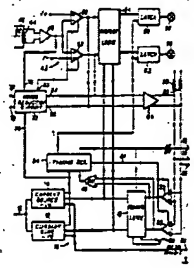
Beckwith et al., "Tracing Current by Inductive Pickup Tracks Logic Faults Precisely", Electronics, vol. 49, No. 23, pp. 106-110, Nov. 25, 1976.
Weston Instruments Model 670 "In-Circuit Tester", (operation manual).
J. F. Beckwith, Current Tracer *A New Way to Find Low Impedance Logic-Circuit Faults*, brochure of Hewlett Packard, pp. 2-8.
M. Hoffman and J. Wrinn, *A Technique for Precise Fault Diagnosis on Device-Laden Buses of LSI Boards*, Teradyne, Inc., pp. 371-376.

Primary Examiner—Gerard R. Strecker
Attorney, Agent, or Firm—Dale Gaudier

[57] ABSTRACT

A probe for sensing the direction of flow of an injected current pulse along a conductor of a circuit under test. The probe is linked to automatic test equipment (ATE), and is triggered to inject the pulse during a test sequence at a step previously found by the ATE to establish a faulty state in the circuit so that the faulty one of several components connected to a circuit node can be identified. The probe injects an approximately triangular-waveform current pulse which has a steep rising edge and a less steep falling edge, thereby inducing a voltage level and thus permits discrimination of the direction of current flow. To detect low level current pulses in the presence of masking noise, the output of the probe is connected to the series combination of a filter, an integrator and an A/D converter. The circuit under test is set to its faulty state, and then the probe is repeatedly operated, first with the injection of the current pulses inhibited and then with current pulses being injected. An average noise level is calculated, and then compared with the average signal level obtained while pulses are being injected to determine the direction of flow of the injected current pulses.

9 Claims, 8 Drawing Figures



Tagged | US 4345201 A | Tag: S,P,T1 | Doc: 11/29 | Format: KWIC

US-PAT-NO: 4345201
DOCUMENT-IDENTIFIER: US 4345201 A
TITLE: Fault location system with enhanced noise immunity

US Patent No. - PN (1):

4345201

US Document Identifier - DID (1):

US 4345201 A

Detailed Description Text - DETX (3):

Accordingly, and as shown in FIG. 1, the apparatus includes a current supply circuit 10, which has a current injection probe 12 coupled to a current source 14 and a current sink 16. For testing a circuit in which the power supply rail is, as is usual, positive with respect to the power return rail, the current source 14 is arranged to supply positive-going current pulses and the current sink 16 is arranged to supply negative-going current pulses. Selection of either the current source 14 or the current sink 16 is controlled by a polarity latch 18 in response either to the signals from two comparators 20 and 22 or to a manually-operable switch 24. The comparators 20 and 22 are coupled, inversely relative to one another, to two input/output terminals 26 and 28. These two terminals 26 and 28 also constitute the power supply terminals of the apparatus, the d.c. power being separated from input and output signals by two chokes 30 and 32 for supply to the various parts of the apparatus along appropriate conductors (omitted for clarity).

Detailed Description Text - DETX (4):

Operation of the current source 14 or the current sink 16 is triggered by a timing circuit 34, and can be inhibited by a signal on an input terminal 36.

Detailed Description Text - DETX (5):

The timing circuit 34 operates in accordance with a control signal on an input terminal 38 to trigger the respective one of the source 14 and the sink 16 selected by the polarity latch 18, either continuously at

United States Patent [19]
Schweitzer, Jr.

[11] 3,816,816
[45] June 11, 1974

[54] INDICATING AND AUTOMATICALLY RESETTABLE SYSTEM FOR DETECTION OF FAULT CURRENT FLOW IN A CONDUCTOR

[72] Inventor: Edmund O. Schweitzer, Jr., Northbrook, Ill.

[73] Assignee: E. O. Schweitzer Manufacturing Co., Inc., Mundelein, Israel

[22] Filed: Aug. 7, 1972

[21] Appl. No.: 278,253

Related U.S. Application Data

[63] Continuation-in-part of Ser. Nos. 873,393, Nov. 3, 1969, abandoned, and Ser. No. 33,332, July 16, 1970, abandoned.

[52] U.S. Cl. ..... 324/133, 324/51, 324/102, 340/253 A

[51] Int. Cl. G01r 19/16, G01r 31/02

[58] Field of Search ..... 324/51, 132, 102, 133, 324/127; 340/253 R, 253 A, 253 P; 317/31

[56] References Cited
UNITED STATES PATENTS

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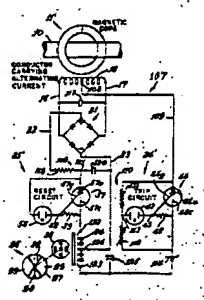
3,419,756	12/1968	Philbert et al.	324/51 UX
3,518,544	6/1970	Tschirk	324/133 X
3,524,133	8/1970	Arndt	324/133 X
3,720,872	3/1973	Russell et al.	324/133

Primary Examiner—Gerard R. Strecker
Attorney, Agent, or Firm—Robert R. Lockwood

[57] ABSTRACT

Fault current flow in a conductor above a predetermined value generates a magnetic field in one direction between the poles of a magnetic core while current flow below this value generates a magnetic field in the opposite direction. A permanent magnetic indicator is movable in response to these magnetic fields and remains in a corresponding position until acted on by the next change in direction of the magnetic field. The magnetic core has one or more pairs of poles and the permanent magnet indicator has a corresponding polar arrangement. The magnetic core has sufficient retentivity to maintain the permanent magnet indicator in the position to which it was last operated when current flow in the conductor is interrupted.

13 Claims, 11 Drawing Figures



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US-PAT-NO: 3816816
DOCUMENT-IDENTIFIER: US 3816816 A
See image for Certificate of Correction
TITLE: INDICATING AND AUTOMATICALLY RESETTABLE SYSTEM FOR DETECTION OF FAULT CURRENT FLOW IN A CONDUCTOR

US Patent No. - PN (1):

3816816

US Document Identifier - DID (1):

US 3816816 A

Details | Text | Image | HTML | KWIC

11	☐	☑	US 4345201 A	19820817	12	Fault location system with enhanc
12	☐	☑	US 3816816 A	19740611	13	INDICATING AND AUTOMATICALLY RES DETECTION OF FAULT CURRENT FLOW
13	☐	☑	US 3629613 A	19711221	9	COMMUTATION DIRECTION CIRCUIT
14	☐	☐	US 6741103 B2	20040525	32	Device using a detection circuit

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United States Patent [19]

Radichel

[11] **4,001,686**

[45] **Jan. 4, 1977**

[54] **ELECTRONIC CIRCUIT TESTING APPARATUS**

[75] Inventor: Frank A. Radichel, Thornton, Colo.

[73] Assignee: Storage Technology Corporation, Louisville, Colo.

[22] Filed: May 28, 1975

[21] Appl. No.: 581,537

[52] U.S. Cl. ..... 324/158 R; 324/51; 324/52; 324/133

[51] Int. Cl.² G01R 31/02; G01R 31/08

[58] Field of Search ..... 324/120, 118, 126, 133, 324/51, 52, 158 R

[56] **References Cited**

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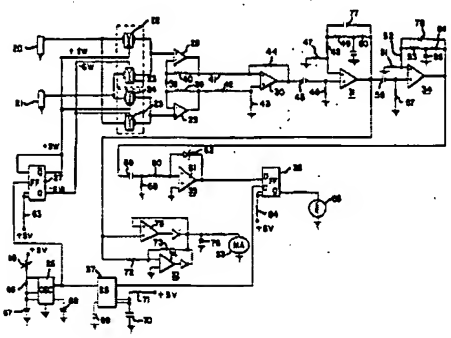
3,619,775	11/1971	Naylor et al.	324/133

Primary Examiner—R. V. Rolinec
Assistant Examiner—Ernest F. Karlsen
Attorney, Agent, or Firm—Woodcock Washburn Kurtz & Mackiewicz

[57] **ABSTRACT**

A failing component connected to a node on a circuit board is located by applying voltage probes to the printed circuit lands connected to the node to determine the direction and magnitude of current flow. By determining the direction and magnitude of current flow to or from each of the components, a reliable determination can be made of the failing circuit component. The direction and magnitude of current flow is determined by use of a polarity indicator which includes a differential chopper amplifier, a high Q, high gain, active filter and digital gating circuitry.

9 Claims, 10 Drawing Figures



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US-CL-CURRENT: 324/524, 324/133 , 324/537

FIELD-OF-CLASSIFICATION-SEARCH: 324/120; 324/118 ; 324/126 ; 324/133 ; 324/51 ; 324/52 ; 324/158R

See application file for complete search history

REF-CITED:

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PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
1446995	February 1923	Sines	324/126 N/A N/A
2114298	April 1938	Gunn	324/118 N/A N/A
2133670	October 1938	Schuchmann	324/118 N/A N/A
3619775	November 1971	Naylor et al.	324/133 N/A N/A

ART-UNIT: 252

PRIMARY-EXAMINER: Rolinec; R. V.

ASSISTANT-EXAMINER: Karlsen; Ernest F.

ATTY-AGENT-FIRM: Woodcock Washburn Kurtz & Mackiewicz

ABSTRACT:

A failing component connected to a node on a circuit board is located by applying voltage probes to the printed circuit lands connected to the node to determine the direction and magnitude of current flow. By determining the direction and magnitude of current flow to or from each of the components, a reliable determination can be made of the failing circuit component. The direction and magnitude of current flow is determined by use of a polarity indicator which includes a differential chopper amplifier, a high Q, high gain, active filter and digital gating circuitry.

9 Claims, 10 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 3

United States Patent [19]
Nishiwaki et al.

[11] Patent Number: 4,739,149
[45] Date of Patent: Apr. 19, 1988

[54] CURRENT SENSOR FOR WELDER CONDUCTOR

[75] Inventors: Toshihiro Nishiwaki; Tetsuo Morita, both of Kanagawa, Japan

[73] Assignee: Obara Corporation, Tokyo, Japan

[21] Appl. No.: 21,115

[22] Filed: Mar. 3, 1987

[30] Foreign Application Priority Data
Oct. 3, 1986 [JP] Japan 61-234403

[51] Int. Cl.[4] B23K 9/10
[52] U.S. Cl. 219/130.01; 219/136; 324/119; 324/127
[58] Field of Search ..... 219/130.01, 137 PS, 219/130.32, 136; 324/76 R, 119, 124, 127

[56] References Cited

U.S. PATENT DOCUMENTS

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4,049,946 9/1977 Fluckiger et al. 219/130.32

FOREIGN PATENT DOCUMENTS

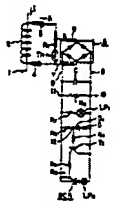
3430730 3/1985 Fed. Rep. of Germany 324/119
55-128373 10/1980 Japan 219/130.32

Primary Examiner—Clifford C. Shaw
Attorney, Agent, or Firm—Flynn, Thiel, Boutell & Tanis

[57] ABSTRACT

A current sensor assures the detection of a current flowing through a welder conductor without requiring a particular power source, and indicates the current state with the aid of a lamp. In one embodiment, a welder conductor penetrates a toroidal core across which connects a slider resistor whose sliding arm connects through a rectifier circuit, and a parallel circuit of a capacitor and a resistor, to a lamp. A second embodiment interposed between the parallel circuit and lamp wherein a series circuit of a second resistor and a Zener diode, and a transistor base is connected to a connection point between the second resistor and a Zener diode, and the emitter-collector circuit of which transistor drives the lamp. A third embodiment adds a further series circuit of another lamp and resistor across the parallel circuit and across the series circuit of the second resistor and the Zener diode. Also, the collector of the transistor is connected to the control terminal of a thyristor, the cathode of which thyristor is connected to the output terminal of the rectifier circuit and to the anode of which thyristor the lamp is connected. The other end of which lamp connects to the other output terminal of said rectifier circuit.

4 Claims, 4 Drawing Sheets



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PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL	
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2114865	April 1938	Traver	324/119	N/A N/A
4049946	September 1977	Fluckiger et al.	219/130.32	N/A N/A

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
3430730	March 1985	DE	324/119
55-128373	October 1980	JP	219/130.32

ART-UNIT: 216
PRIMARY-EXAMINER: Shaw; Clifford C.
ATTY-AGENT-FIRM: Flynn, Thiel, Boutell & Tanis

ABSTRACT:

A current sensor assures the detection of a current flowing through a welder conductor without requiring a particular power source, and indicates the current state with the aid of a lamp. In one embodiment, a welder conductor penetrates a toroidal core across which connects a slider resistor whose sliding arm connects through a rectifier circuit, and a parallel circuit of a capacitor and a resistor, to a lamp. A second embodiment imterposed between the parallel circuit and lamp wherein a series circuit of a second resistor and a Zener diode, and a transistor base is connected to a connection point between the second resistor and a Zener diode, and the emitter-collector circuit of which transistor drives the lamp. A third embodiment adds a further series circuit of another lamp and resistor across the parallel circuit and across the series circuit of the second resistor and the Zener diode. Also, the collector of the transistor is connected to the control terminal of a thyristor, the cathode of which thyristor is connected to the output terminal of the rectifier circuit and to the anode of which thyristor the lamp is connected. The other end of which lamp connects to the other output terminal of said rectifier circuit.

4 Claims, 8 Drawing figures

Exemplary Claim Number: 3

Number of Drawing Sheets: 4

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United States Patent [19]
Liptak

[11] Patent Number: 4,788,493
[45] Date of Patent: Nov. 29, 1988

[54] APPARATUS FOR DETECTING DIRECTION OF ELECTRIC POWER FLOW

[75] Inventor: J. Michael Liptak, Columbia, S.C.
[73] Assignee: Square D Company, Palatine, Ill.

[21] Appl. No.: 140,863
[22] Filed: Jan. 6, 1988

Related U.S. Application Data

[63] Continuation of Ser. No. 677,735, Dec. 4, 1984, abandoned.

[51] Int. Cl.[4] G01R 7/02; G01R 19/14; H02P 3/14
[52] U.S. Cl. ..... 324/140 R; 324/133; 324/134; 324/126; 324/107; 318/376
[58] Field of Search ..... 324/133, 134, 140 R, 324/141, 142, 107, 103 R, 102, 127, 126; 307/127; 318/376, 801, 759-762

[56] References Cited

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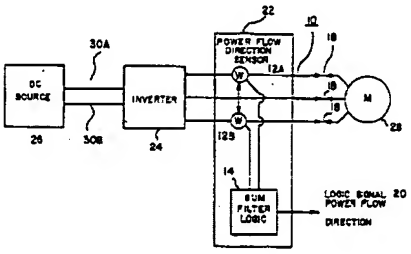
4,321,531	3/1982	Marshall	324/142
4,481,784	5/1984	Milkovic	324/142
4,514,677	4/1985	Kaufman et al.	318/759

Primary Examiner—Reinhard J. Eisenzopf
Assistant Examiner—Jack B. Harvey
Attorney, Agent, or Firm—Richard T. Guttman; A. Sidney Johnston

[57] ABSTRACT

An apparatus for measuring the direction of power flow through conductors connecting a load to a source of alternating electric current, the load being capable of generating electric current, and the source of alternating electric current being capable of accepting power flow from the load. The invention comprises at least one wattmeter connected so that the sum of their outputs is proportional to the power flow through the conductors and the sign of the sum of their outputs is indicative of the direction of the power flow. A detector is provided for detecting the sign of the output of the at least one wattmeter. The detector is capable of generating an indicator signal. The indicator signal has a first value when the power flows from the source of alternating electric current into the load and the indicator signal has a second value when power flows from the load into the source of alternating electric current. The wattmeters have at least one switch having contacts that close in response to application of pulsed voltage to the load. At least one sense electric current substantially proportional to the load current flows through the contacts so that the average current flow, including the sign, through the contacts is proportional to the electric power flowing into or out of the load. Also the wattmeters may have at least one switch which closes in response to pulsed current and have a sense electric current proportional to a load voltage.

20 Claims, 8 Drawing Sheets



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flow of electric power in the direction of arrow 58.

Detailed Description Text - DETX (25):

A control signal 74A is supplied by comparator 76A. Comparator 76A derives its input signal from the voltage between conductors 10B and 10A. Non-inverting amplifier 77A develops an output on line 79A which is connected to the positive terminal of comparator 76B and the negative terminal of comparator of 76A. The negative terminal of comparator 76B connects to +V offset, a positive DC voltage. The positive terminal of comparator 76A connects to -V offset, a negative DC voltage. The offset voltages, +V offset and -V offset, are used to define the output of comparators 76A and 76B when their input on line 79A is zero.

Detailed Description Text - DETX (26):

When the potential on conductor 10A is positive relative to the potential on conductor 10B, then non-inverting amplifier 77A develops a positive output signal on line 79A. When the positive signal on line 79A exceeds +V offset it causes comparator 76B to devleop a positive output signal on control lead 74B, thereby closing electronic switch 72B. Also, the positive output signal on line 79A causes comparator 76A to develop a negative output signal on lead 74A, thereby opening electronic switch 72A.

Detailed Description Text - DETX (31):

The components, amplifier 77A, comparators 76A and 76B, electronic switches 72A and 72B, current transformer 68A, amplifier 70A and 70B, and summation point 78 serve as wattmeter 12A as shown in FIG. 1 and FIG. 2. Similarly, wattmeter 12B is formed by the components amplifier 77B, comparators 88A and 88B, electronic switches 92A and 92B, current transformer 68C, amplifiers 86A and 86B, and summation point 78. Summation point 78 serves as a part of each wattmeter 12A and 12B, and also as the sum part of sum and filter circuit 14. Amplifier 80 serves as the filter portion of circuit 14, along with capacitor 82, resistor 84A and the resistors 84B1, 84B2, 84B3, and 84B4. The resistors 84B1, 84B2, 84B3, and 84B4 are all marked R1 because the same value of resistance may conveniently by employed for each. The resistor 84A is marked R2. The time constant C R2 is chosen to give the desired filter time constant. The ratio of R2/R1 is chosen to obtain the proper gain for amplifier 80.

Detailed Description Text - DETX (33):

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24	☐	☑	US 6160441 A	20001212	14	Sensors for measuring current pas load
25	☐	☑	US 6281673 B1	20010828	8	Low error, switchable measurement circuit
26	☐	☑	US 4788493 A	19881129	19	Apparatus for detecting direction flow
27	☐	☑	US 4488110 A	19841211	8	Voltage monitor with visible leve

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